

*costvar*,  $c$   
*termvar*,  $x, y, z, f$   
*baseAttackVar*,  $b$   
*index*,  $i, j, k$

$op ::=$   
 $\mid op_{\odot}$   
 $\mid op_{\triangleright}$   
 $\mid op_{\sqcup}$   
 $\mid rel_{\multimap}$   
 $\mid rel_{\multimap\multimap}$   
 $\mid rel_{\rightarrow}(c, -)$   
 $\mid rel_{\leftarrow}(c, -)$   
 $\mid rel_{\multimap}(c, -)$   
 $\mid rel_{\multimap\multimap}(c, -)$

$C ::=$   
 $\mid c$   
 $\mid op(C_1, C_2)$

$T ::=$   
 $\mid b$   
 $\mid T_1 \odot_{op_{\odot}} T_2$   
 $\mid T_1 \triangleright_{op_{\triangleright}} T_2$   
 $\mid T_1 \sqcup_{op_{\sqcup}} T_2$   
 $\mid (T)$

$E ::=$   
 $\mid b$   
 $\mid E_1 \odot_{op_{\odot}} E_2$   
 $\mid E_1 \triangleright_{op_{\triangleright}} E_2$   
 $\mid E_1 \sqcup_{op_{\sqcup}} E_2$   
 $\mid E_1 \multimap_{rel_{\multimap}(c, -)} E_2$   
 $\mid E_1 \multimap_{rel_{\multimap\multimap}(C, -)} E_2$   
 $\mid (E) \quad S$

$\Gamma, \Delta, \Theta, \Psi ::=$   
 $\mid \cdot$   
 $\mid (E, c)$   
 $\mid \Theta, \Psi$

$\boxed{\Gamma; \Delta \vdash_C T}$

$\frac{}{\cdot; (b, c) \vdash_c b} \text{ T\_VAR}$

$\frac{}{(b, c); \cdot \vdash_c b} \text{ T\_VARC}$

$\frac{\Gamma_1; \Delta_1 \vdash_{c_1} T_1 \quad \Gamma_2; \Delta_2 \vdash_{c_2} T_2}{\Gamma_1, \Gamma_2; \Delta_1, \Delta_2 \vdash_{op_{\odot}(c_1, c_2)} T_1 \odot_{op_{\odot}} T_2} \text{ T\_PARA}$

$\frac{\Gamma_1; \Delta_1 \vdash_{c_1} T_1 \quad \Gamma_2; \Delta_2 \vdash_{c_2} T_2}{\Gamma_1, \Gamma_2; \Delta_1, \Delta_2 \vdash_{op_{\triangleright}(c_1, c_2)} T_1 \triangleright_{op_{\triangleright}} T_2} \text{ T\_SEQ}$

$$\frac{\Gamma_1; \Delta_1 \vdash_{c_1} T_1 \quad \Gamma_2; \Delta_2 \vdash_{c_2} T_2}{\Gamma_1, \Gamma_2; \Delta_1, \Delta_2 \vdash_{\text{op}_\sqcup(c_1, c_2)} T_1 \sqcup_{\text{op}_\sqcup} T_2} \quad \text{T\_CHOICE}$$

$$\boxed{\Theta; \Psi \vdash_C E}$$

$$\frac{}{\vdash; (E, c) \vdash_c E} \quad \text{E\_VAR}$$

$$\frac{}{(E, c); \cdot \vdash_c E} \quad \text{E\_VARC}$$

$$\frac{\Theta; \Psi \vdash_{c_1} T}{\Theta; \Psi \vdash_{c_1} (T \sqcup_{\text{op}_\sqcup} T) \multimap_{\text{rel}_{\multimap}(\text{op}_\sqcup(c_1, c_1), -)} T} \quad \text{E\_CHOICECONT}$$

$$\frac{\Theta; \Psi \vdash_{c_1} T_1 \sqcup_{\text{op}_\sqcup} T_2}{\Theta; \Psi \vdash_c (T_1 \sqcup_{\text{op}_\sqcup} T_2) \multimap_{\text{rel}_{\multimap}(c_1, -)} (T_2 \sqcup_{\text{op}_\sqcup} T_1)} \quad \text{E\_CHOICESYM}$$

$$\frac{\Theta; \Psi \vdash_{c_1} (T_1 \sqcup_{\text{op}_\sqcup} T_2) \sqcup_{\text{op}_\sqcup} T_3}{\Theta; \Psi \vdash_c ((T_1 \sqcup_{\text{op}_\sqcup} T_2) \sqcup_{\text{op}_\sqcup} T_3) \multimap_{\text{rel}_{\multimap}(c_1, -)} (T_1 \sqcup_{\text{op}_\sqcup} (T_2 \sqcup_{\text{op}_\sqcup} T_3))} \quad \text{E\_CHOICEASSOC}$$

$$\frac{\Theta; \Psi \vdash_{c_1} T_1 \odot_{\text{op}_\odot} (T_2 \triangleright_{\text{op}_\triangleright} T_3)}{\Theta; \Psi \vdash_c (T_1 \odot_{\text{op}_\odot} (T_2 \sqcup_{\text{op}_\sqcup} T_3)) \multimap_{\text{rel}_{\multimap}(c_1, -)} ((T_1 \odot_{\text{op}_\odot} T_2) \sqcup_{\text{op}_\sqcup} (T_1 \odot_{\text{op}_\odot} T_3))} \quad \text{E\_DISTPARA}$$

$$\frac{\Theta; \Psi \vdash_{c_1} T_1 \triangleright_{\text{op}_\triangleright} (T_2 \sqcup_{\text{op}_\sqcup} T_3)}{\Theta; \Psi \vdash_c (T_1 \triangleright_{\text{op}_\triangleright} (T_2 \sqcup_{\text{op}_\sqcup} T_3)) \multimap_{\text{rel}_{\multimap}(c_1, -)} ((T_1 \triangleright_{\text{op}_\triangleright} T_2) \sqcup_{\text{op}_\sqcup} (T_1 \triangleright_{\text{op}_\triangleright} T_3))} \quad \text{E\_DISTSEQ}$$

$$\frac{\Theta_1; \Psi_1 \vdash_{c_1} E_1 \quad \Theta_2; \Psi_2 \vdash_{c_2} E_2}{\Theta_1, \Theta_2; \Psi_1, \Psi_2 \vdash_{\text{op}_\odot(c_1, c_2)} E_1 \odot_{\text{op}_\odot} E_2} \quad \text{E\_PARAI}$$

$$\frac{\Theta_1; \Psi_2 \vdash_{\text{op}_\odot(c_1, c_2)} E_1 \odot_{\text{op}_\odot} E_2 \quad \Theta_2; \Psi_1, (E_1, c_1), (E_2, c_2), \Psi_3 \vdash_{c_3} E_3}{\Theta_1, \Theta_2; \Psi_1, \Psi_2, \Psi_3 \vdash_{c_3} E_3} \quad \text{E\_PARAE}$$

$$\frac{\Theta_1; \Psi_1 \vdash_{c_1} E_1 \quad \Theta_2; \Psi_2 \vdash_{c_2} E_2}{\Theta_1, \Theta_2; \Psi_1, \Psi_2 \vdash_{\text{op}_\triangleright(c_1, c_2)} E_1 \triangleright_{\text{op}_\triangleright} E_2} \quad \text{E\_SEQI}$$

$$\frac{\Theta_2; \Psi_2 \vdash_{\text{op}_\triangleright(c_1, c_2)} E_1 \triangleright_{\text{op}_\triangleright} E_2 \quad \Theta_1, (E_1, c_1), (E_2, c_2), \Theta_3; \Psi_2 \vdash_{c_3} E_3}{\Theta_1, \Theta_2, \Theta_3; \Psi_1, \Psi_2 \vdash_{c_3} E_3} \quad \text{E\_SEQE}$$

$$\frac{\Theta; \Psi_1, (E_1, c_1), (E_2, c_2), \Psi_2 \vdash_c E}{\Theta; \Psi_1, (E_2, c_2), (E_1, c_1), \Psi_2 \vdash_c E} \quad \text{E\_EX}$$

$$\frac{\Theta_1; \Psi_1 \vdash_{c_1} E_1 \quad \Theta_2; \Psi_2 \vdash_{c_2} E_2}{\Theta_1, \Theta_2; \Psi_1, \Psi_2 \vdash_{\text{op}_\sqcup(c_1, c_2)} E_1 \sqcup_{\text{op}_\sqcup} E_2} \quad \text{E\_CHOICE}$$

$$\frac{\Theta; \Psi, (E_1, c_1) \vdash_{c_2} E_2 \quad \text{rel}_{\multimap}(c_1, c_2)}{\Theta; \Psi \vdash_{c_2} E_1 \multimap_{\text{rel}_{\multimap}(c_1, -)} E_2} \quad \text{E\_IMPI}$$

$$\frac{\Theta_1; \Psi_1 \vdash_{c_2} E_1 \multimap_{\text{rel}_{\multimap}(c_1, -)} E_2 \quad \Theta_2; \Psi_2 \vdash_{c_1} E_1}{\Theta_1, \Theta_2; \Psi_1, \Psi_2 \vdash_{c_2} E_2} \quad \text{E\_IMPE}$$

Definition rules: 20 good 0 bad  
Definition rule clauses: 36 good 0 bad